



**JOHN F. KENNEDY
SPACE CENTER**

**INSTITUTIONAL ENVIRONMENTAL
IMPACT STATEMENT**

PREFACE

This Environmental Impact Statement pertains to the John F. Kennedy Space Center as an Institution, and assesses the operations at this activity as related to the environment.

The Statement has been prepared to conform to the Guidelines of the Council On Environmental Quality and to NASA management documents.

ENVIRONMENTAL IMPACT STATEMENT

KENNEDY SPACE CENTER

1. DESCRIPTION OF THE PROPOSED ACTION

A. MISSION DESCRIPTION

The John F. Kennedy Space Center (KSC), previously the Launch Operations Directorate of Marshall Space Flight Center (MSFC), was established at Cape Kennedy, Florida, in November, 1963. It serves as the primary center for assembly, test, checkout and launch of NASA space vehicles. This includes responsibility for the launch of manned or unmanned vehicles at the KSC Merritt Island launch sites. It also includes responsibility for launch of NASA manned or unmanned vehicles from KSC/Eastern Test Range (ETR) and for unmanned vehicles at Western Test Range (WTR). The Center is presently concentrating on the Apollo Program manned launches as well as on the scientific automated spacecraft launches. Plans call for:

- (1) Two Apollo Program manned launches in 1971 and two in 1972 from KSC.
- (2) Four Skylab launches in 1973 from KSC.
- (3) Twenty-four unmanned launches in 1971 through 1973 from KSC/ETR.
- (4) Eleven unmanned launches in 1971 through 1973 from KSC/WTR.

B. FACILITY DESCRIPTION

The John F. Kennedy Space Center (KSC) is located on the east coast of Florida, 150 miles south of Jacksonville, and approximately 50 miles east of Orlando. It is immediately north and west of Cape Kennedy, formerly Cape Canaveral. A major portion of the area is situated in the northern part of Brevard County between the Indian River and the Atlantic Ocean, with the extreme north boundary extending about seven miles into Volusia County Florida. The Center is about 34 miles long and varies in width from 5 to 10 miles. Land and facilities on Merritt Island and certain facilities within the boundaries of Cape Kennedy Air Force Station are NASA responsibility. (See Attachment A for general information.)

Headquarters for the Center is located at the Industrial Area on Merritt Island. Office buildings, Data Acquisition facilities, Cleaning Laboratory facilities, Checkout facilities, Storage facilities, and Shops are located either at the Industrial Area or to the north in the vicinity of the Vehicle Assembly Building (VAB) at Launch Complex 39 (LC-39).

Launch Complex 39 is the facility at the Kennedy Space Center developed to launch large payloads into space. The first use of this mobile concept facility is by the Apollo Manned Lunar Landing Program, currently in operation. It is being developed and outfitted for launch of the Skylab Earth Orbital Workshop Program. It is also available for other future programs. This launch complex includes Launch Pads 39A and 39B, the Vehicle Assembly Building, three Mobile Launchers, one Mobile Service Structure, Propellant Facilities and High Pressure Gas Facilities. Pad and launch complex facilities include: miscellaneous portable equipment, control and checkout systems, monitoring and analysis equipment, and associated data links with the Range and Mission Control Center. Pad 39A has the capability to support the Apollo Saturn V space vehicle with a thrust of 7 1/2+ million pounds. Scheduled usage includes Apollo 15, 16 and 17 missions through 1972. Launch Pad 39B is currently being modified to support programmed Skylab launches SL-1/SL-2, SL-3 and SL-4 through 1973. Pad 39A will also be used for the Skylab Program.

Unmanned launch programs utilize Launch Complexes 17, 36 and 41.

Launch Complex 17 is located on the Cape Kennedy Air Force Station on the Eastern Test Range (ETR). It consists of two launch pads, a blockhouse, a support building, propellant storage facilities, high pressure gas facilities, miscellaneous portable equipment, control and checkout systems, and monitoring and analysis equipment. This complex is used to launch unmanned payloads by Delta launch vehicles with up to 500,000 pounds thrust. Launches are presently being considered up through 1978.

Launch Complex 36 is also located on the Cape Kennedy Air Force Station. A single blockhouse serves its two launch pads. Complex facilities include propellant storage facilities, high pressure gas facilities, control and checkout equipment, and monitoring and analysis equipment. Atlas/Centaur vehicles with 433,000 pounds of thrust are launched from this complex. Unmanned payloads are scheduled for launch by Atlas/Centaurs through 1976.

Titan III Complex (Pad 41) is located as shown on Attachment A. It is called an Integrated Transfer Launch (ITL) system and has a Vertical Integration Building (VIB) that contains three launch control centers, a Solid Motor Assembly Building (SMAB), and two launch pads (40 and 41). NASA will share use of this complex with the Air Force with NASA using one bay of the VIB, one launch control center, the SMAB as required, and Launch Pad 41. Unmanned launches are scheduled through 1975 on the Titan III Centaur which has 2,400,000 pounds of thrust. All operation and maintenance of support facilities for Pad 41 is performed by the Air Force in accordance with NMI 1052.129, USAF-NASA Memorandum of Agreement--Titan III C Launch Vehicle for Applications Technology Satellites F&G.

The total land and water area under jurisdiction of KSC is approximately 140,000 acres. Of this total, approximately 85,000 acres are owned by NASA and the remaining 55,000 acres are owned by the State of Florida and dedicated to the exclusive use of the U. S. Government. Some 84,000 of the total 140,000 acres is permitted to the Department of the Interior for use as the Merritt Island National Wildlife Refuge. This area, with adjoining water bodies, provides sufficient area to afford adequate safety to the surrounding civilian community for planned vehicle launchings. A portion of the seashore on the eastern edge of the Center is available for public recreation purposes on a non-interference basis.

The Western Test Range Operations Division of KSC is a tenant on the Vandenburg Air Force Base, California. One launch complex consisting of two launch pads, a blockhouse, an operations building, and support facilities is operated at this location in the launch of Delta Launch Vehicles.

KSC does not have any Non-Programmatic R&D Activities.

2. PROBABLE TOTAL IMPACT OF JOHN F. KENNEDY SPACE CENTER (KSC) OPERATION ON THE ENVIRONMENT

Operations at KSC will have negligible effect on the environment and the outlook for the future indicates that this condition will prevail.

The normal day-to-day operations and the occasional special or one-time institutional operations that occur at KSC, which is an assembly and checkout/test operation vs. a manufacturing operation, are on a controlled basis. The work is essentially "clean" and

the launch type operations do not involve manufacturing. All support operations for test/launch are governed by schedules and procedures, none of which require an operation that results in significant degradation of environment quality. Industrial operations such as on-site operation of sewage treatment plants and boiler houses are in accordance with current County, State and Federal regulations. Completion of the pollution control program institutional items submitted for the FY-72 budget will place KSC in compliance with Brevard County and State of Florida Regulations. (Rules of the Florida Air and Water Pollution Control Commission, Chapters 28-5 and 28-7 and the requirement for tertiary treatment to be effective in 1973.) Electric power for the Center is purchased from the Florida Power and Light Company.

KSC has had a beneficial effect on wildlife population. Controlled access imposed on employees and on the public has assured minimum interference with wildlife food, shelter and breeding areas.

KSC has had a generally overall beneficial effect on Brevard County. Although a drop in employment has occurred since the first manned lunar landing July 20, 1969, the Center activity has continually assisted in the development of County material resources and in the comfort and standard of living of the residents in the area. For the next two years, the Center activity will continue to have a stabilizing effect since major changes in employment and in program efforts are not expected.

At KSC/Western Test Range a modification is underway to improve the method of transfer of toxic propellants to a spill pond in event of an accidental spill.

Industrial type noise sources are evaluated by the Environmental Health Unit to assure acceptable working conditions and hearing protection for Center personnel. Characteristics of noise resulting from launch of Apollo Program Vehicles are referenced in the Apollo Program Impact Statement.

SNAP devices are handled at KSC under strict safety standards and controls. Any particular device for a launch remains at the Center for approximately six weeks. Characteristics of the device are referenced in the Apollo Program Environmental Impact Statement.

3. ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL, PROJECT OR ACTION BE IMPLEMENTED OR CONTINUED

Operations of the John F. Kennedy Space Center (KSC) will have minimum adverse effect on the environment. Experience to date indicates that the assembly/test/checkout type operation is essentially a clean operation when compared to one of a manufacturing nature.

All utility and maintenance of institutional facility type operations are controlled either by written procedures or by standard industrial "good practice" operations. This includes the monitoring and necessary adjustments to conform to County, State and Federal pollution control regulations.

Launch support type operations, which include handling of propellants, are also performed under strict operational and safety procedures. Provisions are made in advance for avoiding and entrapping accidental spills, and all hazardous operations including the handling of propellants/toxic materials are performed by specially trained personnel. Approximately 700,000 gallons of cryogenics such as liquid oxygen and hydrogen are discharged during a typical launch operation of a Saturn V vehicle. The hydrogen is burned, and the oxygen is discharged as a vapor. There are no known harmful effects to the environment. Waste fuels and toxic materials are disposed of by the Air Force at the Cape Kennedy Air Force Station.

Hypergolic propellants are loaded into launch vehicles by means of closed recirculating systems. The Apollo Spacecraft vents helium and nitrogen with minute traces of propellants. During an Apollo launch operation, less than 5 gallons of hydrazine and 5 gallons of nitrogen tetroxide (N_2O_4) are vented. In Delta vehicle operation, red fuming nitric acid is vented through scrubbers. The Delta Vehicles are scheduled to use nitrogen tetroxide (N_2O_4) in place of red fuming acid beginning in 1972. Analysis indicates that about one gallon of N_2O_4 will be vented during a launch. Vent stacks possibly in conjunction with the scrubbers may be used. Traces of hydrazine are also vented. Titan IIC vehicles carrying NASA payloads will be managed by the Air Force.

Indices of the absence of environmental degradation on KSC are apparent with regards to wildlife and citrus grove operation. Merritt Island is a wildlife refuge under the management of a resident representative of the Department of the Interior. A measure of the ecological balance maintained during vehicle launch operations may be taken from bird watching observations. Rare species are generally "holding their own" and the local Audubon Society reports recognition

of about 250 varieties of birds, enough to rank this area among the leading locations in the United States.

The impact of toxic rocket propellants on vegetation on or near the Center has been studied under contract. Significant plant injury from operations has not been observed. Citrus groves on the Center that are operated under lease, have produced bumper crops in the past and the current year, and are actively sought under competitive bidding procedures. All leases include pollution control clauses and restricted uses of pesticides and fertilizers. Use of these chemicals (quality and frequency of application) is controlled and is governed by State of Florida Department of Citrus and Department of Agriculture publications. Negotiations are currently underway to transfer administrative control of the groves and wildlife refuge areas from KSC to the Department of the Interior, Bureau of Sport Fisheries and Wildlife.

There will be no adverse effects on the environment if the institutional pollution control projects listed in the FY-72 budget are completed. The improvements are in accordance with EO 11507 and Local and State regulations, and they will:

- (1) Eliminate the discharge of untreated waste water containing oil, biodegradable detergents and battery acid/water mixtures into a drainage ditch.
- (2) Eliminate the discharge of secondary treated sewage effluents into run-offs leading to the Indian and Banana Rivers.
- (3) Result in the replacement of inoperative subsurface disposal systems by connection to an existing sewage treatment plant or by installation of a packaged sewage treatment plant.
- (4) Result in the installation of remote go/no-go signal readout of sewage pump stations and sewage treatment plant operation.

Other construction projects scheduled for implementation in FY-72 generally of the modification type and, from analysis based on the Council of Environmental Quality Guidelines, do not cause an adverse effect on the environment.

4. ALTERNATIVES TO THE PROPOSAL OR ACTION

Kennedy Space Center must continue to operate if the NASA Space Programs are to be completed. There are no alternatives to the

operation of KSC since launches cannot be accomplished elsewhere without expenditure of millions of dollars to duplicate facilities. Further, there are no known reasons to justify that the ecology of the State or Nation would be improved if the operation and facilities were moved to another location.

The pollution control projects listed in the KSC FY-72 CofF program, which eliminate adverse effects, must be accomplished to conform with EO 11507 and State of Florida standards.

5. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The Kennedy Space Center is aware of the relationship between local short-term uses of the environment and its effect on the maintenance and enhancement of long-term productivity. Short-term uses of the environment, such as an occasional burning, are held to a minimum, and long-term uses are maintained as free as possible of detrimental effects.

Because of the minimum number of short-term uses at KSC, the long-term productivity of the environment is sufficient to maintain the ecological balance. There is only one institutional short-term use and this is on a controlled basis. A fire training facility located four miles from populated areas is required for training of fire department personnel, personnel assigned to the launch pad, and rescue and emergency crews. Any adverse effect on the environment is rigidly controlled so as to be negligible as far as the land and water are concerned, and is not considered detrimental air pollution. Necessary training is performed under strict procedures. The facility is used approximately 30 days per year when approximately 15,000 gallons of hydrocarbon fuel (mostly waste fuel) are burned annually. Combustion products resulting from hydrocarbon burning include CO_2 , SO_2 , H_2O and NO_2 . The facility is also used 4 days per year for Hypergolic Fire Protection Training which is performed strictly according to procedures. This is the only Hypergolic Fuel Training Facility in the United States and is essential for training. During the operations, 200 gallons of nitrogen tetroxide (N_2O_4 oxidizer) ignites with 200 gallons of hydrazine. N_2O_4 and hydrazine are used in propulsion systems for launch vehicles and spacecraft. Products resulting from spontaneously igniting N_2O_4 and hydrazine include oxides of nitrogen, hydrazine base compounds and water.

Occasional controlled burning of dried foliage occurs when new roads or facilities are constructed. Since the construction effort at the Center is virtually complete, this burning is negligible. Other construction debris is removed from the site by the construction contractor and disposed of at the Brevard County, State of Florida operated disposal areas.

Since the Center is an assembly and launch facility, and is not a manufacturing facility, many of the industrial wastes associated with manufacturing are nonexistent. The standard type utility operations required to support populated areas are monitored to assure compliance with County, State and Federal regulations, and are operated according to procedures augmented by good industrial practice. The same applies to test/launch work except that work is strictly controlled and strictly scheduled by detailed written procedures some of which are written specifically for each test/launch.

The Center has accepted the invitation from the Office of Space Science and Applications to participate in earth resources and environmental studies conducted under the Earth Observations Program Director and the Communications Program Director. Actions are now under way to develop a plan to implement this decision. It is anticipated that this effort will produce information that, when used in conjunction with that already available, will provide the Center with the intelligence to assure that its activities do no significant harm to either the ecology of the area or the environment.

There is one situation at KSC that could possibly be upgraded in the future for enhancement of long-term productivity operations. The two Central Heat Plants may require modification to burn natural gas as a fuel or may require a change in fuel oil specifications if stack gas emissions for this area are further restricted by the County, State or Federal Government. Otherwise, there is no known situation at KSC that has a detrimental effect on the long-term productivity. To the contrary, there are many situations which indicate that the long-term productivity is preserved and generally in balance. Typical examples of these situations are as follows:

- (1) Wildlife at the Merritt Island National Wildlife Refuge has not suffered from KSC activity. The controlled access to KSC has probably enhanced the food, shelter and breeding areas. This refuge is under the management of the Department of Interior and a resident manager is on-site. An agreement is in effect whereby authorities from the Department of Interior, the Brevard County Mosquito Control District and Florida State Board of Health meet each year to

discuss the impact that one agency may have on another. A NASA representative is present for coordination.

(2) The Center maintains an Environmental Health activity that is actively engaged in surveillance of operations concerned with environmental quality and in monitoring the health aspects of populated areas. A program exists whereby surface water is sampled and surveilled to assure that KSC operating elements do not inadvertently chemically pollute surface water on or around KSC.

(3) To comply with a new restriction on the use of chromate based materials which enter waters, a test program was set up to determine substitutes. The test results provided information for KSC to enter into a competitive contract for the supply of biodegradable chemicals. (Note: These chemicals are used to prevent corrosion in heat exchange equipment that have continuous circulation.)

(4) Toxic materials, hydrocarbons and propellants are handled in accordance with written procedures, and provisions are made to avoid and entrap accidental spills. Waste toxic materials and propellants are disposed of in accordance with written agreements between NASA and the Air Force at the Cape Kennedy Air Force Station.

(5) Waste treatment facilities are strictly controlled. NASA forwards copies of test results on sewage plant operations to the Brevard County representative for his review. The representative makes inspections of the NASA operations. Consultation with State representatives concerning information on future requirements has enabled KSC to program construction (FY-72 CofF) in sufficient time to meet the requirements of EO 11507 and the State of Florida.

(6) The Sanitary Land Fill operation on KSC, for solid waste disposal, conforms to the Rules of the State Board of Health, Chapter 170C-10 of the Sanitary Code of Florida. The Environmental Health element monitors the operation.

(7) KSC has two laboratories where Ground Support Equipment is cleaned and serviced for use in launch support systems. All waste chemical cleaning solutions are disposed of by the Air Force. Waste disposal is under surveillance by the Environmental Health unit.

(8) All food type garbage/trash from cafeterias is processed through a food waste grinder (garbage disposal unit) by the food contractor. The material enters the sanitary collection system and is then processed through a municipal type tertiary treatment sewage plant.

(9) Insect and pest control procedures require the application of non-persistent pesticides and rodenticides as recommended by the U.S. Department of Agriculture and the Department of Health, Education and Welfare. Guidelines of the Federal Committee on pest control and the Florida State Board of Health also govern usage on KSC. The mosquito problem is reduced by eliminating mosquito breeding areas where possible and the site receives service from the Brevard County Mosquito Control District. The mosquito "cell" or impoundment has reduced the problem by natural and biological methods.

6. THE IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF NATURAL RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED OR CONTINUED

The operation of Kennedy Space Center is a current action rather than a proposed one. As an assembly and test facility KSC is essentially a "clean" industry as compared with manufacturing, chemical, smelting and others.

For an Apollo/Saturn V launch operation, KSC uses 12,000,000 standard cubic feet of helium which is not retrievable. There is no known degradation of the environment.

The Center is currently using about 900,000 gallons of potable water daily. About 700,000 gallons of this water is discharged to the area through sanitary treatment facilities, cooling tower bleed-off piping, and support facility discharges. The balance of 200,000 gallons, is mostly cooling tower drift and evaporation and other non-polluting uses.

The burning of fuel oil at the Center is within the limitations of law as shown by stack emission sampling performed under the guidance of a representative of the National Air Pollution Control Administration. The Center consumes approximately 3,600,000 gallons of hydrocarbon fuel annually. Some used lubricating oil is

offered for sale through General Services Administration processes, and some waste hydrocarbons are burned in plants as a conservation measure.

Electric power is generated off-site by the Florida Power and Light Company. The Air Force administers the contract with the power company and KSC reimburses the Air Force for the power used.

7. COORDINATION

For some years, KSC has carried on active continuing coordination with County, State and local Air Force officials. Information on significant items of a conceptual nature which could have an impact on local government and population as well as exchange of technical information to include monthly data on waste treatment plant effectiveness, has been provided.

Coordination efforts on the draft statement with local Air Force, County, State and Regional EPA (Atlanta, Ga.) indicate there are no significant problem areas.

8. SUMMARY

KSC operates a "clean" function of assembly, checkout, and launch as contrasted to manufacturing, chemical processing, smelting, etc. The gathering of people in a concentrated location to serve as a workforce does not essentially increase their water and food consumption, nor production of waste. It does require the provision for adequate disposal methods, which in most instances have been significantly superior to those of the off-duty community in which they live. This is attributable to the pre-planning, design and continued professional surveillance normal to activity of this nature.

This is not to imply that no problems exist at KSC in the environmental area. The necessary rapid growth of the facilities was not always able to keep pace with the changing deployment of personnel engaged in essentially experimental activities. Pollution control equipment which was once the best available has been made obsolete either by technological improvements or by more strict governmental standards of treatment. An increased sensitivity to, and understanding of the importance of environmental control has raised new requirements, especially in the area of wildlife protection.

Not unlike the rest of the Nation, the problem of environmental quality attracted the attention of professional personnel at KSC through the news media. Prior to EO 11507, the implementation of EO 11282 and 11287 surveys of such obvious "tools" as the waste treatment plants were undertaken. Upon issuance of EO 11507, informal committee actions were established to broaden the base of this effort to include the "enhancement" concept in addition to the "corrective" activity already started. This has resulted in a program embodied within the FY-72 CofF program request. Recognizing that practical time deadlines necessitated a cutoff for the FY-72 submission, and that EO 11507 contemplated a much broader forward program, the Center Director established a mechanism for coordination of the environmental effort by issuance of KMI 8800.3. KSC Prevention, Control, and Abatement of Air and Water Pollution. This establishes the mechanism for environment protection and for prevention, control and abatement of pollution. The concept includes the "systems approach" which has checks and balances to assure broad coverage of Center operations and elimination of duplication of effort. The technical elements of KSC located within the organizational Directorates perform the bio-environmental planning, programming, treatment processing, operations, quality control, design and reporting according to their responsibilities. The document establishes a Center "Pollution Control Officer" to assure that all environmental inputs, information and techniques are properly channeled, and that all expertise of the Center is brought to bear on the problem.

Future activity generally will involve constant attention to new standards of environmental quality, new techniques for achieving these standards, and new laws and regulations bearing on the subject. One future project of a major nature at KSC involves air pollution. The two Central Heat Plants at KSC are presently operating within existing stack emission restrictions. A modification to burn natural gas or a change in the fuel oil specification may be necessary in the future if County, State or Federal Government restrictions are increased.

JOHN F. KENNEDY SPACE CENTER,
NASA

KENNEDY SPACE CENTER, FLORIDA

MASTER PLAN

DATE MAY 1971

SCALE GRAPHIC

TAB NO. IV - 1

SHEET NO.

